

AMENDMENTS TO THE DRAWINGS:

The attached sheet of drawings includes changes to FIG. 2. This sheet, which includes FIG. 2, replaces the original sheet including this same figure. In FIG. 2, reference number "65" and an associated lead line are deleted.

Attachments: Replacement Sheet
Annotated Sheet Showing Changes

REMARKS

This communication is a full and timely response to the aforementioned non-final Office Action dated July 17, 2006. Claims 1-31 are pending. Claims 13, 14, and 24-31 have been withdrawn from consideration. Pursuant to MPEP § 821.04(b), once Claims 1 and 15, which are directed to a substrate support, are found allowable, Applicant respectfully requests that withdrawn process Claims 13, 14, 24, and 25, which depend from Claims 1 and 15, be rejoined with the elected subject matter. Reconsideration and allowance are respectfully requested in view of the following remarks.

Examiner Interview

As an initial matter, Applicant's representative would like to thank Examiner Rakesh Dhingra and Supervisory Patent Examiner Parviz Hassanzadeh for the courtesies extended during the personal interview conducted on Aug. 23, 2006. The substance of the interview, incorporated in the following discussion, included a discussion of Examiner Dhingra's interpretation of Claims 1, 4, 7, 9, and 11 and the applied reference of Tamura et al. (U.S. Patent No. 6,676,805).

Objection to the Drawings

The Official Action objects to the drawings under 37 C.F.R. § 1.84(p)(5). In the Replacement Sheet for FIG. 2, submitted herewith, the reference number "65" and an associated lead line have been deleted. As such, Applicant respectfully requests the withdrawal of the objection.

Claim Rejections - 35 U.S.C. § 103**A. Claims 1, 2, 4, 6, 7, 9, 11, and 12**

Claims 1, 2, 4, 6, 7, 9, 11, and 12 were rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Tamura et al (U.S. Patent No. 6,676,805) ("Tamura ") in view of Matsumura et al. (U.S. Patent No. 5,225,663) ("Matsumura"). Applicant respectfully traverses this rejection.

As stated in MPEP § 2143, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify a reference or to combine reference teachings.

Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim features. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). The mere fact that references can be combined or modified does not render the resultant combination obvious unless the references also suggest the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990).

Claim 1 recites, *inter alia*, a substrate support useful in a reaction chamber of a plasma processing apparatus, the substrate support comprising a metallic heat transfer member overlying the ceramic member, the heat transfer member having a maximum thickness of about ¼ inch, the heat transfer member including at least one flow passage through which a liquid can be circulated to heat and/or cool the heat transfer member; and an electrostatic chuck overlying the heat transfer member (emphasis added).

The Official Action acknowledges that Tamura does not disclose the thickness of the heat transfer member and cites Matsumura to allegedly cure the deficiency of Tamura (Official Action at page 4, line 4). Applicant respectfully disagrees, because the combination of these applied references does not teach or suggest all the claim features and there is no suggestion or motivation for the combination, as discussed in the during the recent personal interview.

First, the Official Action alleges that Tamura discloses at least one flow passage through which a liquid can be circulated (Official Action at page 3, lines 19-20). However, Tamura discloses that the coolant is a cooling gas (column 5, lines

17-23), not a liquid. Moreover, Tamura states a preference for helium "because helium does not affect the etching characteristic when it leaks, and because the supplying or exhausting time ... [is] shorter than for other gases" (column 10, lines 56-59). However, Tamura does not disclose that the coolant is a "liquid," as recited in Claim 1. As such, the combination of Tamura and Matsumura does not teach or suggest all the claim features, and does not support the alleged *prima facie* obviousness for at least this reason.

Second, the Official Action alleges that Tamura discloses an electrostatic chuck overlying the heat transfer member and cites reference character **18** in Figure 9 of Tamura (Official Action at page at page 3, lines 21 to page 4, line 1). However, Tamura discloses that **18** is a dielectric material (column 14, lines 37-38), rather than an electrostatic chuck, as recited in Claim 1. For this additional reason, the combination of Tamura and Matsumura does not teach or suggest all the claim features.

Third, the Official Action contends that the motivation for the combination of the applied references is to enable control of the thermal mass for achieving the desired heating or cooling of the wafer (Official Action at page 4, lines 15-18). However, Tamura's substrate already comprises "a coolant flow passage **42** for conducting a coolant to control the temperature of the substrate 1" (column 14, lines 43-44; Figure 9) (emphasis added). Moreover, "[t]he coolant to control the temperature of the substrate **1** is introduced into the coolant flow passage **42** ... to control the temperature of the holding member **2** and the dielectric material **18** at a given temperature" (column 15, lines 41-47) (emphasis added). In other words, Tamura already provides for a mechanism for controlling the desired heating or

cooling of the wafer. Thus, there is no motivation or suggestion of modifying Tamura with the secondary reference of Masuda, because Tamura already provides for a mechanism for controlling the temperature of substrate 1 with a coolant. As such, the Official Action has not established the requisite motivation for the proposed modification of Tamura.

Claim 4 recites, *inter alia*, a source of temperature controlled liquid in flow communication with the at least one flow passage. The Official Action alleges that Tamura discloses a source of temperature controlled liquid in flow communication with the at least one flow passage (Official Action at page 4, lines 19-21). Applicant respectfully disagrees. As discussed above regarding Claim 1, Tamura discloses that the coolant is a cooling gas (column 5, lines 17-23), rather than a "liquid," as recited in Claim 4. As such, the combination of Tamura and Matsumura do not teach or suggest all the claim features.

Claim 7 recites a heat transfer member comprises a base including the at least one flow passage, and a cover overlying the base (emphasis added). The Official Action alleges that Tamura discloses a heat transfer member comprising a base including the at least one flow passage, and a cover overlying the base (Official Action at page 5, lines 7-9). Applicant respectfully disagrees.

Tamura does not disclose or suggest that the heat transfer member comprises a cover, as recited in Claim 7. As such, the combination of Tamura and Matsumura does not teach or suggest all the claim features. Moreover, Tamura teaches away from the possible use of holding member 2 (or "heat transfer element") being joined as two separate parts because Tamura states that "such problems as an increase in complexity and a decrease in reliability due to extra jointing portions

or extra volume being required" (column 18, lines 44-50) and thus, "present invention employs a manufacturing method where the holding member 2 is formed in a one-piece structure" (emphasis added) (column 18, lines 56-58). As such, Applicant respectfully submits that there is no suggestion or motivation to modify Tamura.

Claim 9 recites, *inter alia*, that the electrostatic chuck contacts the ceramic ring. The Official Action alleges that Tamura discloses a ceramic ring overlying the ceramic member and surrounding the heat transfer member and the electrostatic chuck, the heat transfer member being laterally spaced from the ceramic ring, the electrostatic chuck contacting the ceramic ring (Official Action at page 5, lines 10-14). Applicant respectfully disagrees.

Tamura's dielectric material 18 is not an electrostatic chuck, as discussed above regarding Claim 1. Moreover, from Figure 9 of Tamura, dielectric material 18 does not contact susceptor 36 (or "ceramic ring"); a distinct gap separates dielectric material 18 from susceptor 36. As such, the combination of Tamura and Matsumura does not teach or suggest all the claim features.

Claim 11 recites, *inter alia*, an elastomeric joint between the ceramic member and the heat transfer member, and an elastomeric joint between the heat transfer member and the electrostatic chuck (emphasis added).

The Official Action alleges that Tamura discloses a substrate support further comprising an elastomeric joint between the ceramic member and the heat transfer member, and an elastomeric joint between the heat transfer member and the electrostatic chuck (Official Action at page 5, lines 15-18). Applicant respectfully disagrees.

The Official Action does not identify any specific disclosure in Tamara with respect to the features of an elastomeric joint between the ceramic member and the heat transfer member and an elastomeric joint between the heat transfer member and the electrostatic chuck. However, to the extent that the Official Action has taken the position that Tamara discloses these claim features, Applicant submits that the Official Action apparently equates "elastomeric joint between the ceramic member and the heat transfer member" and "elastomeric joint between the heat transfer member and the electrostatic chuck," as recited in Claim 11, to Tamara's "elastomer seal" used to join separate parts of holding member 2 (column 18, lines 44-48). However, Tamara discloses the possible use of an "elastomeric joint" to attach two separate pieces of holding member 2 (or "heat transfer element"), rather than joining the ceramic member to the heat transfer member and joining heat transfer member to the electrostatic chuck. As such, the combination of Tamura and Matsumura does not teach or suggest all the claim features.

Because a *prima facie* case of obviousness has not been established, Applicant respectfully requests the withdrawal of the rejection of claims 1, 2, 4, 6, 7, 9, 11, and 12 under 35 U.S.C. §103(a).

B. Claims 3, 15, 16, 18, 20, 22, and 23

Claims 3, 15, 16, 18, 20, 22, and 23 were rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Tamura, in view of Matsumura, in further view of Kadotani et al (U.S. Pub. No. 2004/0163601) ("Kadotani"). Applicant respectfully traverses this rejection.

The Official Action acknowledges that the combination of Tamura and Matsumura does not disclose the dimensions of the flow passage as recited in Claim

3, and cites Kadotani to allegedly cure the deficiency of Tamura and Matsumura (Official Action at page 6, lines 3-15). However, Kadotani fails to cure the above-described deficiencies regarding the combination of Tamura and Matsumura, with respect to Claim 1. Accordingly, Applicant submits that Claim 3 is patentable over the applied references for at least the same reasons as those discussed above regarding Claim 1.

Independent Claim 15 recites, *inter alia*, a substrate support useful in a plasma processing apparatus, comprising a heat transfer member including at least one flow passage in fluid communication with the liquid source and through which the liquid can be circulated to heat and/or cool the heat transfer member at a rate of from about 0.25-2 °C/sec; and an electrostatic chuck overlying the heat transfer member (emphasis added).

The Official Action acknowledges that the combination of Tamura and Matsumura does not disclose the heating or cooling rate as recited in Claim 15, and cites Kadotani to allegedly cure the deficiencies of Tamura and Matsumura (Official Action at page 7, lines 1-9). Applicant respectfully disagrees.

First, Tamura's dielectric material **18** is not an electrostatic chuck and there is no motivation or suggestion of modifying Tamura with the secondary reference of Masuda, as discussed above regarding Claim 1.

Second, the Official Action alleges that Tamura discloses a source of temperature controlled liquid in flow communication with the at least one flow passage (Official Action at page 4, lines 19-21). However, Tamura does not disclose "a source of temperature controlled liquid" as discussed above regarding Claim 4. Moreover, Kadotani discloses that the cooling medium in flow channel slits **11** and

12 is heat conducting helium gas (paragraphs [0075], [0078]), rather than a "temperature controlled liquid," as recited in Claim 15. Furthermore, Kadotani teaches away from liquid coolants, because Kadotani discloses that the use of liquid coolant require more time to adjust the temperature of the substrate, than their gas counterparts (paragraph [0013]). In other words, Kadotani discloses that the use of liquid coolants lowers the throughput of processing (paragraph [0013]). As such, the combination of Tamura and Matsumura does not teach or suggest all the claim features.

Because a *prima facie* case of obviousness has not been established, Applicant respectfully requests the withdrawal of the rejection of Claims 3, 15, 16, 18, 20, 22, and 23 under 35 U.S.C. §103(a).

C. Claim 5

Claim 5 was rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Tamura in view of Matsumura and in further view of Oda et al. (U.S. Patent No. 6,474,986) ("Oda"). Applicant respectfully traverses this rejection.

The Official Action acknowledges that Tamura and Matsumura do not disclose that the source of temperature controlled liquid includes a Peltier cooler operable to change the temperature of the liquid, as recited in Claim 5, and cites Oda to allegedly cure the deficiencies of Tamura and Matsumura (Official Action at page 8, lines 8-22). However, Oda fails to cure the above-described deficiencies regarding the combination of Tamura and Matsumura, with respect to Claim 4. Accordingly, Applicant respectfully submits that Claim 5 is patentable over the applied references for at least the same reasons as those discussed above regarding Claim 4.

Because a *prima facie* case of obviousness has not been established, Applicant respectfully requests the withdrawal of the rejection of Claim 5 under 35 U.S.C. §103(a).

D. Claim 8

Claim 8 was rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Tamura in view of Matsumura and in further view of Yatsuda et al. (U.S. Patent No. 6,488,863) ("Yatsuda") and Mahawili (U.S. Patent No. 6,007,635) ("Mahawili"). Applicant respectfully traverses this rejection.

Claim 8 recites, *inter alia*, that the heat transfer member is disposed on the recessed surface and laterally spaced from the flange (emphasis added). The Official Action acknowledges that Tamura and Matsumura do not disclose the ceramic member with a recessed surface, as recited in Claim 8, and cites Yatsuda to allegedly cure the deficiencies of Tamura and Matsumura (Official Action at page 9, lines 4-12). Moreover, the Official Action acknowledges that Yatsuda does not disclose a heat transfer member laterally spaced from the flange (Official Action at page 9, lines 13-15). However, the Official Action does not cite any additional prior art that discloses or suggests a heat transfer member laterally spaced from the flange. Moreover, Mahawili fails to cure the above noted deficiencies regarding the combination of Tamura, Matsumura and Yatsuda, with respect to Claim 8. As such, the combination of applied references do not teach or suggest all the claim features.

Because a *prima facie* case of obviousness has not been established, Applicant respectfully requests the withdrawal of the rejection of Claim 8 under 35 U.S.C. §103(a).

E. Claim 10

Claim 10 was rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Tamura in view of Matsumura and in further view of Kanno et al (U.S. Patent No. 6,373,681) ("Kanno "). Applicant respectfully traverses this rejection.

The Official Action acknowledges that Tamura and Matsumura do not disclose the RF power source electrically connected to the heat transfer member, as recited in Claim 10, and cites Kanno to allegedly cure this deficiency (Official Action at page 10, lines 12-22). However, Kanno fails to cure the above noted deficiencies regarding the combination of Tamura and Matsumura, with respect to Claim 1. Accordingly, Applicant respectfully submits that Claim 10 is patentable over the applied references for at least the same reasons as those discussed above regarding Claim 1.

Because a *prima facie* case of obviousness has not been established, Applicant respectfully requests the withdrawal of the rejection of Claim 10 under 35 U.S.C. §103(a).

F. Claim 17

Claim 17 was rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Tamura in view of Matsumura and Kadotani and in further view of Yang et al. (U.S. Patent No. 6,635,580) ("Yang"). Applicant respectfully traverses this rejection.

The Official Action acknowledges that Tamura, Matsumura and Kadotani do not disclose a heat transfer gas source operable to supply a heat transfer gas between the support surface and the substrate; and a controller operable to control operation of the liquid source and the heat transfer gas source, as recited in Claim 17, and cites Yang to allegedly cure this deficiency (Official Action at page 11, lines

7-17). However, Yang fails to cure the above noted deficiencies regarding the combination of Tamura, Matsumura and Kadotani, with respect to Claim 15. Accordingly, Applicant respectfully submits that Claim 17 is patentable over the applied references for at least the same reasons as those discussed above regarding Claim 15.

Because a *prima facie* case of obviousness has not been established, Applicant respectfully requests the withdrawal of the rejection of Claim 17 under 35 U.S.C. §103(a).

G. Claim 19

Claim 19 was rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Tamura in view of Matsumura and Kadotani and in further view of Yatsuda and Matsumura. Applicant respectfully traverses this rejection.

Claim 19 recites, *inter alia*, that the heat transfer member is disposed on the recessed surface and laterally spaced from the flange (emphasis added). The Official Action acknowledges that Tamura, Matsumura, and Kadotani do not disclose the ceramic member with a recessed surface, as recited in Claim 19, and cites Yatsuda to allegedly cure this deficiency (Official Action at page 12, lines 7-16). Moreover, the Official Action acknowledges that Yatsuda does not disclose a heat transfer member laterally spaced from the flange (Official Action at page 12, lines 17-20). However, the Official Action does not cite any additional prior art that discloses or suggests a heat transfer member laterally spaced from the flange. Moreover, Mahawili fails to cure the above noted deficiencies regarding the combination of Tamura, Matsumura, Kadotani and Yatsuda, with respect to Claim 19. As such, the combination of applied references do not teach or suggest all the claim features.

Because a *prima facie* case of obviousness has not been established, Applicant respectfully requests the withdrawal of the rejection of Claim 19 under 35 U.S.C. §103(a).

H. Claim 21

Claim 21 was rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Tamura in view of Matsumura and Kadotani and further in view of Kanno. Applicant respectfully traverses this rejection.

The Official Action acknowledges that Tamura, Matsumura and Kadotani do not disclose an RF power source electrically connected to the heat transfer member, as recited in Claim 21, and cites Kanno to allegedly cure this deficiency (Official Action at page 13, lines 13-19). However, Kanno fails to cure the above noted deficiencies regarding the combination of Tamura, Matsumura and Kadotani, with respect to Claim 15. Accordingly, Applicant respectfully submits that Claim 21 is patentable over the applied references for at least the same reasons as those discussed above regarding Claim 15.

Because a *prima facie* case of obviousness has not been established, Applicant respectfully requests the withdrawal of the rejection of Claim 21 under 35 U.S.C. §103(a).

Conclusion

For at least the foregoing reasons, Applicant respectfully submits that all pending claims are allowable, and this application is in condition for allowance. Accordingly, Applicant requests a favorable examination and consideration of the

instant application. Should Examiner Dhingra wish to discuss this application,
Applicant requests that the undersigned be contacted at the number below.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date: September 7, 2006

By:



Eric B. Chen
Registration No. 52,725

P.O. Box 1404
Alexandria, VA 22313-1404
703 836 6620



2/4

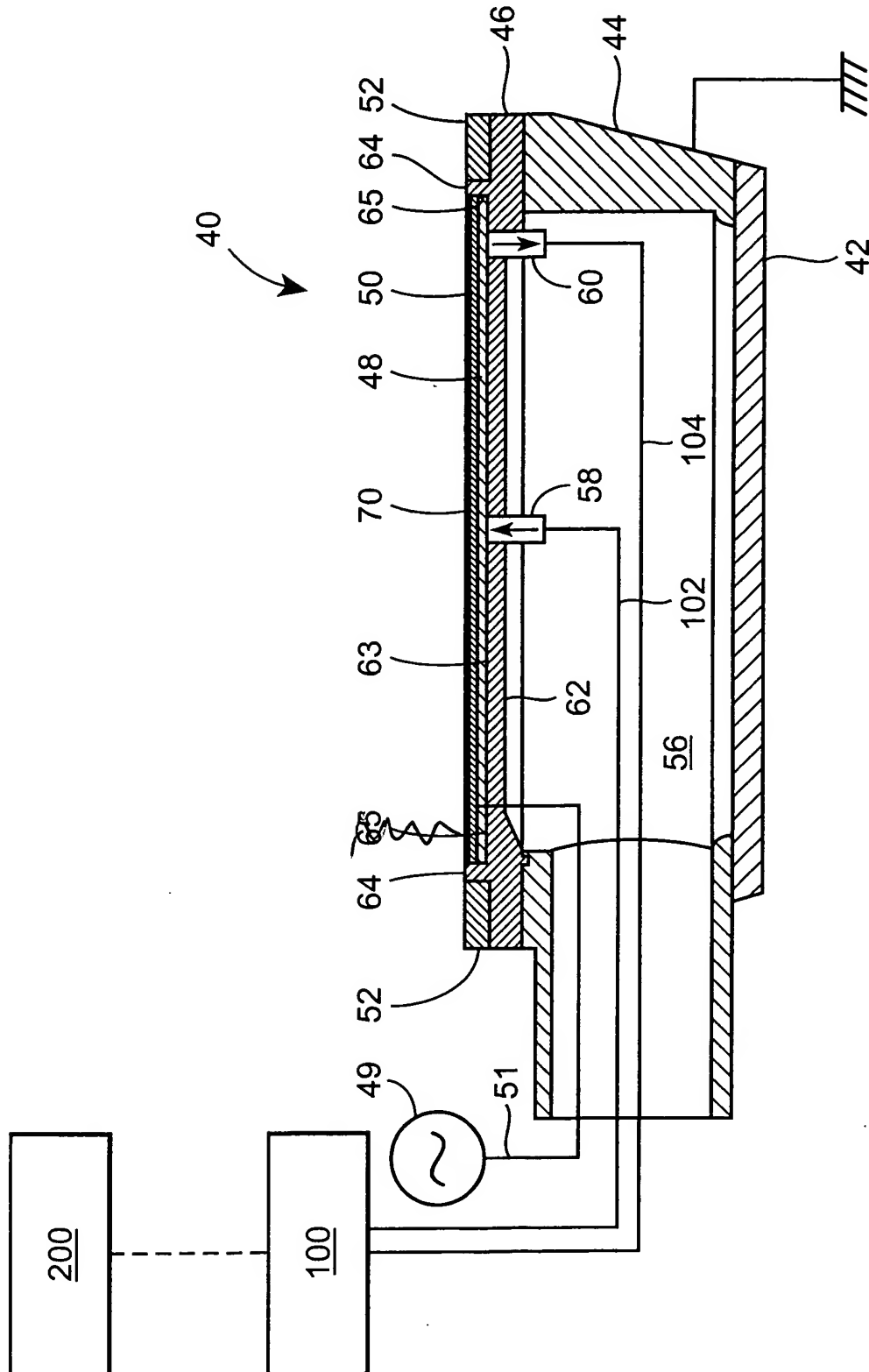


FIG. 2